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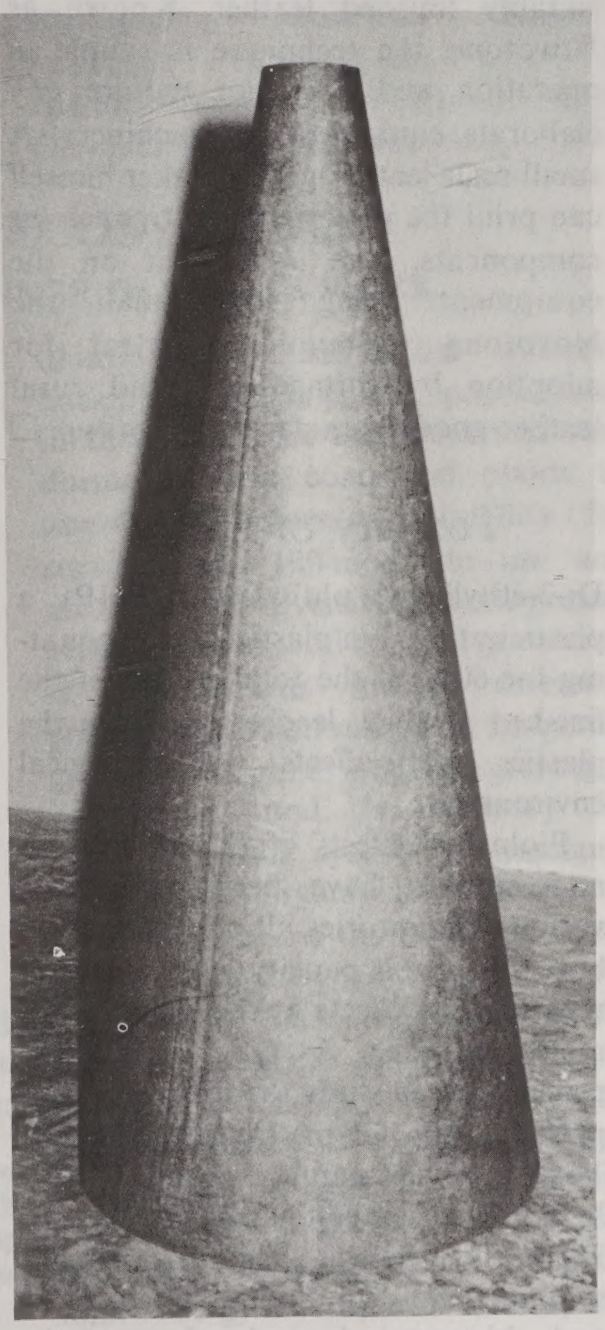
L Develops Composite Nose Cones for erospace Applications

a view to replacing the con-onal homogeneous (metallic) nose of aircraft and missiles, the onal Aeronautical Laboratory), Bangalore, has designed and oped composite (FRP) nose cones. composite cones have many ntages over metallic cones such as r strength-to-weight ratio, higher ess-to-weight ratio, resistance to sion, ease of construction, low ng cost, and insulation properties. integrated thermal and structural sis through a finite element ramme was necessary for designing se cone. NAL carried out the nal stress analysis of a composite cone by finite element analysis a high-precision axisymmetric of revolution element with 2 nodal s and 14 d.o.f. Axisymmetric ure distribution over a cone was mined for a typical flight trajectory onsidering all the three regions—onic, transonic and supersonic—and tions of static pressure with Mach ber were obtained.

e cones were designed to withstand nal and mechanical loads. As the ctive was only to replace the llic cone, there was no fresh dynamic design involved, the other netrical dimensions being retained. design variables considered were material system, lay-up pattern and ness. E-glass epoxy was considered ace of E-glass phenolic as the latter some problems in its shelf life. ination parameters considered were fibre orientation and stacking sequence.

The laboratory has fabricated three nose cones using pressure bag moulding process, as the cones obtained in this process have less resin content, are void-free, and possess good glass densification and better dimensional control.

The structural response of the cones subjected to pressure loading was studied by applying distributed loading along the generator and measuring the strains and displacements. The quality of the nose cones fabricated was found to be satisfactory. □



FRP nose cone developed by NAL

Zinc Silicate Green Phosphor

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a process for making zinc silicate green phosphor, a chemical used mainly in green fluorescent tube lights. It is also used in cathode luminescent devices, oscilloscope screens, etc. It has an annual demand of 3 tonnes, which is being met by imports only.

The CECRI process consists in mixing zinc oxide, silica and manganese nitrate or chloride thoroughly in distilled water and drying the mixture at 110°C. The dried mass is heated in silica vessels in the temperature range 1100°-1300°C. The resultant mass is ground and sieved.

The capital investment required for a plant of 3 tonnes/annum capacity has been estimated at about Rs 3.58 lakh; the cost of production works out to be Rs 125/kg.

The process has been assigned to the National Research Development Corporation of India for commercial utilization. □

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Calcium Carbide

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a process for making calcium carbide, a chemical used for the production of acetylene gas, PVC plastics and organic chemicals, as a desulphurizing and deoxidizing agent in metallurgy, and as a nodularizing agent in the production of nodular graphite in iron. The estimated demand for the carbide will be 2,30,000 tonnes by 1983-84.

In the CECRI process, calcium carbide is manufactured by reacting high-quality quicklime with carbonaceous materials such as coke, charcoal and petroleum coke at 2200°C in a submerged electric arc furnace. The process can be taken up by the small-scale sector.

The capital investment required for a plant of 225 tonnes/annum capacity has been estimated at about Rs 11.92 lakh; the cost of production works out to be Rs 6.10/kg, and return on investment, 16.95%.

The process has been assigned to the National Research Development Corporation of India for commercial utilization. □

Novotone - A Novel Method of Printing on Leathers

NRDC AWARDWINNING INVENTION

Dr T.S. Ranganathan, Shri R. Krishnamurthi and Shri K.A. Ramaswamy of the Central Leather Research Institute, Madras, have been jointly awarded the National Research Development Corporation of India's 1981 Republic Day Award for developing a novel technique of printing various designs and patterns on the grain side of leather using half-tone blocks. The technique, whose objective is to utilize, to the maximum extent possible, hides and skins with grain and other defects, consists in making a photographic print (actual size) of the selected grain pattern or design and preparing a half-tone block and printing the design on a suitably finished leather. Known as Novotone, the technique is simple in operation and does not require any elaborate equipment or machinery. A small-scale leather-goods maker himself can print the patterns on cut panels or components. The investment on the equipment being very small the Novotone technique is ideal for adoption by cottage-scale and rural leather-goods manufacturing units. □

Shoes made of cobra skin pattern leather

Toxicity of DEHP

Di-2-ethylhexyl phthalate (DEHP), a plasticizer used in plastics and accounting for 60% of the total weight of the finished product, leaches out from the plastics and affects the biological environment.

Biological effects of DEHP in man and animals have been studied in various laboratories all over the world but still there is paucity of information regarding its effects at the cellular and molecular levels. As part of its R&D programme to study the toxic effects of plastics and polymers, the Industrial Toxicology Research Centre (ITRC), Lucknow, has investigated the effects of DEHP on liver with regard to protein synthesis and degradation, biochemical and histopathological changes in seminiferous tubules and interaction DEHP with dietary proteins.

The studies, carried out by Shri K Rajasekharan Pillai under the guidar of Dr P.K. Seth of ITRC, have sho that DEHP affects the efficiency of fo utilization. In DEHP-exposed anima the absolute weights of kidney, bra and testis decreased, whereas the liv weight increased. Liver xanthine o dase and succinate dehydrogena activities decreased, whereas micr somal enzyme aminopyrine dem thylase and NADPH cytochron reductase registered an increase. DN RNA, protein and moisture contents liver revealed that hepatomegaly in ra raised on low-protein diet and receivir DEHP was not different from that of th normal protein-fed DEHP-treated an mals. Liver enlargement in anima receiving low-protein diet and DEH may be attributed to hypertrophy hepatocytes.

The two target organs, viz. liver an testis, behaved differently toward DEHP. While no histopathologica lesions were observed in liver, atrophy testis occurred. In liver, protei breakdown decreased leading to in creased protein content, perhaps due t stabilization of lysosomes; in testi protein synthesis decreased and protei breakdown increased, resulting i decreased protein content and labili zation of lysosomes.

Testicular atrophy in animals ex posed to DEHP was associated wit varying biochemical changes, cellula damage and destruction of seminiferou tubules. Within 24 hr of the first dose o DEHP, only cathepsin D registered an increase of 43%, which may be the early biochemical change leading to cessation of spermatogenesis.

Estimation of serum enzyme activities indicated that DEHP administration in rats receiving low-protein diet did no cause any liver damage. However, the decrease in growth rate, increase in mortality and testicular lesions obser ved in low-protein diet fed animal indicated that there existed a re

ionship between DEHP and the otein component of the diet.

The findings of the study would be eful in designing more purposeful periments with hepatocytes or sper atocytes to delineate the molecular echanism of toxicity associated with EHP.

Shri Pillai, who worked at ITRC on eputation from the Government of erala, was awarded Ph.D. degree by he Kerala University for his thesis ased on the studies. □

Deputation Briefs

hri S.M. Sharma of the Central lectronics Engineering Research Insti ute, Pilani, was deputed, from 2 October to 26 November 1980, to the Federal Republic of Germany under the CSIR-DAAD Exchange of Scientists Programme. During his stay in FRG he worked at the Institut für Grandlagen der Elektrotechnik und Elektrische Meβ echnik, Technische Universitat, Braunschweig with Prof. Dr Ing. H.H. Emschermann on temperature measurement techniques. He also acquinted himself with the current developments in the field of temperature calibration during his visit to Physikalisch Technisch Bundesanstalt, Braunschweig. □

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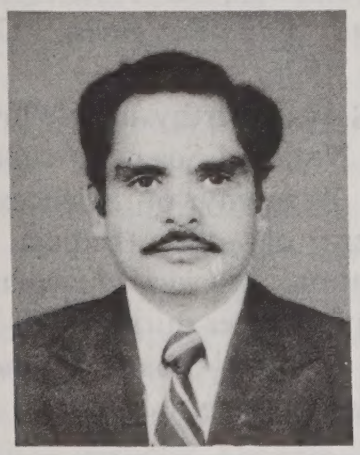
Dr T.V.S.R. Appa Rao of the Structural Engineering Research Centre, Madras, visited FRG from 6 September to 9 October 1980 to get acquainted with the recent developments in the application of the finite element technique for analysis and design of various structures, in particular the design of cooling towers and ship structures. During his deputation, under the CSIR-DAAD Exchange of Scientists Programme, Dr Rao visited Institut für Statik and Dynamik der Luft und Raumfahrtkonstruktionen, Universitat Stuttgart; Institut für Konstruktiven Ingenieurbau, Bochum; and Germanifcher Lloyd, Hamburg. □

GRASSLAND ECOSYSTEMS

BHATNAGAR PRIZEWINNER Dr SINGH'S WORK

Dr Singh has done pioneering work in ecology with particular reference to grassland ecosystems. His studies have encompassed ecophysiology, produc-



tivity, energy flow, species diversity and mathematical modelling. His studies have shown, for instance, that: (i) intraspecific, latitudinal differentiation occurs in plant populations; (ii) thermoperiodic behaviour and seed dormancy help concerned plants to assess environmental suitability for survival; and (iii) moderate use and greater species diversity generate greater productivity in seral tropical grasslands in contrast to inverse diversity-productivity relationship of temperate grasslands. Light to moderate grazing, it has been found, is necessary for maintaining the system as grassland, and massive organic matter accumulation destabilizes the ungrazed grassland and may move the system towards forest stage. The architecture of the tropical grassland canopy having a dynamic multilayered structure due to the occurrence of species adapted differentially to light and moisture and having different growth forms, makes the system highly efficient in trapping light energy. Temporal and spatial partitioning of assimilates in grassland vegetation is such that it favours above-ground canopy development during the warm and wet period, and storage below ground in a relatively cool and dry period. Favourable effects have been observed of water-soluble compounds, available carbohydrates, acid-detergent cell wall material and nitrogen, and unfavourable effects of lignin and cellulose contents, on plant decomposition. The inadequacy of soil respiration data to explain the magnitude of energy dissipation suggests that more mobile soil organisms such as termites play a significant role in plant decomposition in tropical grasslands where the biomass turns over 2-3 times faster compared to temperate systems. A linear compartment model using time varying coefficients has been developed which adequately explains the seasonal behaviour of biomass in different components. Also, a management model for tropical grasslands using both simulation and optimization techniques has been developed which shows that the inclusion of a light grazing year after every 5-6 years of moderate grazing is a suitable management strategy for tropical grasslands as this helps recoup the legumes.

Currently, Dr Singh's team is engaged in studies on the vegetation of the Kumaon Himalaya from the viewpoints of ecosystem analysis including productivity and nutrient cycling, phytosociology and vegetation mapping, and resource ecology using traditional as well as remote sensing techniques. Some of the interesting findings, so far obtained, include: (i) simultaneous occurrence of slow as well as fast exchange pools in nutrient cycling in mixed forests, (ii) adverse regeneration situation in oaks, (iii) greater ecological advantages of broad-leaf forest canopy over conifer forest canopy, and (iv) comparatively greater resistance of C-3 grasses to water stress compared to C-4 grasses in the mountains.

Dr Singh (born 26 Dec. 1941) obtained his B.Sc. and M.Sc. degrees from the Allahabad University. After a

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Dr J.S. Singh, Reader in Botany, Kumaun University, Nanital, has been named (jointly with Prof. Asis Datta) recipient of Shanti Swarup Bhatnagar Prize for 1980 in biological sciences [*CN*, 31 (1981), 1].

brief spell of service with the Botanical Survey of India, he moved to the Banaras Hindu University from where he obtained his Ph.D. degree. Thereafter, he joined the faculty of Kurukshetra University in 1968 and moved to the Kumaun University in 1976. From 1971 to 1974, Dr Singh was at the Natural Resource Ecology Laboratory, Colorado State University, USA, as a Visiting Scientist and Special Graduate Faculty. While at Colorado State University, he was involved in the International Biological Programme (IBP, Grassland Biome). Dr Singh synthesized the worldwide IBP work on plant processes, with the help of an international team of scientists, which has been published in several chapters by the Cambridge University Press in 1979-80.

Dr Singh is the English language editor of the multilingual journal *Tropical Ecology*; a member of the Indian National Committee for SCOPE; a fellow of the International Society for Tropical Ecology, and of the National Institute of Ecology. He was elected a member of Sigma Xi (Colorado Chapter). Dr Singh has more than 125 technical publications to his credit. □

NEUTRON BEAM RESEARCH ON MAGNETISM AND MAGNETIC MATERIALS

BHATNAGAR PRIZEWINNER DR SATYA MURTHY'S WORK

Dr Satya Murthy has made pioneering investigations in the development and use of neutron scattering techniques in the study of magnetism and magnetic materials. Using slow neutron beams at the CIRUS reactor Dr Satya Murthy has elucidated the magnetic structures of a number of ferro-, antiferro- and

ferrimagnetic materials. He was one of earliest workers in the world to set up a polarized neutron spectrometer. Using this instrument, which he developed totally indigenously, Dr Satya Murthy has recently investigated in depth the magnetization distribution in magnetite (Fe_3O_4), which is the parent of all modern ferrites. His studies reveal that there is considerable covalency in this material, resulting in a spin transfer from the magnetic atoms to the oxygen. His work has also brought out the high distortion of the magnetic electron orbitals in MnAlGe, a ternary permanent magnet material which has a large magneto crystalline anisotropy.

Dr Satya Murthy has also employed polarized neutrons for measuring the energies of magnetic excitations, called spin waves, in a number of ferrites and used these measurements to evaluate the exchange interactions in these materials. He has also explored the mechanism of magnetic ordering in 3*d* metals and their alloys and investigated the role of 4*d* impurities in a 3*d* metal.

Dr Satya Murthy has, in the course of this work, developed highly sophisticated neutron spectrometers, high-field magnets, cryostats and electronic control instrumentation. Recently, several countries in Asia have acquired their use such spectrometers design and developed by him. He has al trained many young scientists worki at reactor centres in the Philippin Korea, Indonesia and Thailand and h been leading a coordinated researc programme among these centres.

In the last few years Dr Satya Murth has inspired the development Trombay of other microscopic tech niques in solid state physics lik Compton scattering and light scatterin He is currently designing new instru ments and techniques for neutron bea research to be used with a powerful ne reactor being built at BARC.

Dr Nivarthi Suryanarayana Satya Murthy (born 5 Feb. 1936, Bangalore obtained his B.Sc. (1954), B.Sc.(Hons) i physics (1956), and M.Sc. in nuclea physics and cosmic rays (1957) from th University of Mysore and Ph.D. (1967) from the University of Bombay. He started his career at BARC in 1958 after receiving his training at the Atomic Energy Training School. He has held various positions: research affiliate at Argonne National Laboratory, USA (1960-62); IAEA expert on neutron crystal spectrometry and adviser to the Philippine Atomic Energy Commission, Manila (1965-66); and guest scientist at AERE, Harwell, UK (1970-71, 1976) and Institute Lane-Langevin, Grenoble, France (1976).

Dr Satya Murthy is a fellow of the Indian National Science Academy and Indian Academy of Sciences. A life member of the Indian Physics Association, he was chairman of its Bombay Chapter during 1977-79. He is on the editorial board of *Bulletin of Materials Science*. □

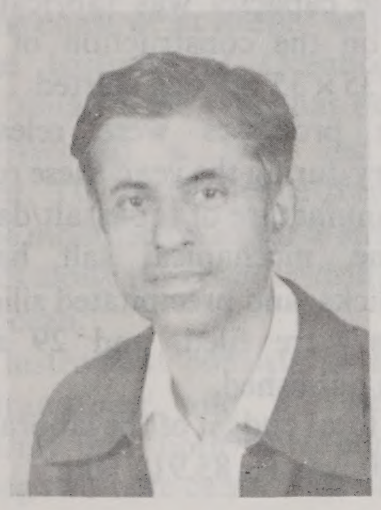
Dr N.S. Satya Murthy, Head, Solid State Physics Section, Nuclear Physics Division, Bhabha Atomic Research Centre Bombay, has been named (jointly with Prof. N. Mukunda) recipient of the Shanti Swarup Bhatnagar Prize for 1980 in physical sciences [*CN*, 31(1981), 1].

MATHEMATICS OF CLASSICAL AND QUANTUM PHYSICS

BHATNAGAR PRIZEWINNER PROF. MUKUNDA'S WORK

Prof. Mukunda's work is concerned with several mathematical aspects of the classical and quantum descriptions of physical systems. The analysis of symmetry within quantum mechanics involves a well-developed area of mathematics known as group representation theory, and different kinds of

metry find expression through respondingly different groups. Prof. kunda has contributed to the resentation theory of several impor- t groups that are relevant to mentary particle physics, including Lorentz and Poincare groups which basic to the study of relativistic ysical systems. In collaboration with teacher Prof. E.C.G. Sudarshan, he developed new approaches to ssical dynamics, bringing out and phasizing features that are suggested the structure of the newer discipline quantum mechanics. These researches m the content of a standard nograph on the subject. Over the last



w years, Prof. Mukunda has made portant contributions within classical namics to the description and nsequences of symmetry for a special ass of physical systems which are chnically known as 'singular systems'. his is an area whose study was initiated P.A.M. Dirac about thirty years ago, d whose importance in current search is continually increasing. More cently, Prof. Mukunda has col- borated with Prof. Sudarshan and hers in developing a consistent rmalism and physically acceptable eories for describing classical interact- g relativistic particles. The significance this work lies in the fact that for quite me time it was believed that, on the asis of generally reasonable physical assumptions, such theories could not be constructed at all.

Quantum mechanics and classical mechanics are related in very special ways: the latter emerges as a limiting case of the former, and yet, in practice, one sets up quantum descriptions of physical systems starting with classical descriptions and then using heuristic arguments justified by their success. Thus the 'more correct' theory is often 'inferred' from its limiting form. Prof. Mukunda has tried to bring out the analogies between classical and quantum descriptions of physical systems, thus helping to bridge the gap between the more easily visualizable classical theory on the one hand and the more basic quantum theory on the other. Within quantum mechanics he has worked on several aspects including, in particular, the theory of infinite component relativistic wave equations, and the theory of the Wigner distribution function. The interest in relating classical and quantum pictures of phenomena finds an echo again in collaborative work with Prof. Sudarshan in the field of quantum optics.

Prof. Mukunda (born 25 January 1939) graduated in mathematics from the Delhi University in 1958, and was a member of the physics group in the Training School of the Atomic Energy Establishment in 1958-59. He was a student of the Tata Institute of Fundamental Research, Bombay, from 1959 to 1961, and obtained his Ph.D. in physics from the University of Rochester, Rochester, N.Y., USA, in 1964. He was a Research Associate at Princeton and Syracuse universities. After five years as a fellow and later as Reader at the Tata Institute of Fundamental Research in Bombay, he moved in 1972 to his present position as Professor, Centre for Theoretical Studies, IISc, Bangalore. He has been Visiting Professor of Physics at the University of Texas at Austin, the Institute of Theoretical Physics in Gothenberg, Sweden, the Duke University in Durham, N.C., USA, and the Institute of Theoretical Physics of the University of Naples, Italy. He is a fellow of the Indian Academy of Sciences and of the Indian National Science Academy. □

*rof. N. Mukunda, Centre for Theoretical udies, Indian Institute of Science, Bangalore, has en named recipient (jointly with Dr N.S. Satya urthy) of Shanti Swarup Bhatnagar Prize for 80 in physical sciences. [*CN*, 31(1981), 1].

PROGRESS REPORTS

CSMCRI Annual Report: 1979

Thirty-eight research projects were investigated by the Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, according to its annual report for 1979 published recently. The principal areas of work of the laboratory were: Salt, and marine and inorganic chemicals; Desalination through distillation, reverse osmosis and electrodialysis techniques; Marine algae; Sea water irriculture; and Solar energy utilization.

Production of spherical crystals of salt under a vacuum evaporator was an important achievement in the area of salt and chemicals. Further work was in progress to generate more data in 20 kg scale production with a view to designing a triple effect evaporator system. Experiments on the extraction of potassium chloride as carnallite from mixed salt were continued and it was possible to achieve 80% efficiency in the process. High-strength plaster of Paris, intended for end uses like casting and jigger moulds in ceramic industry, was prepared from marine gypsum and sent for evaluation. Studies on calcination of limestone from four places and enrichment of lime slurry were completed in order to make lime suitable for refractory-grade magnesia. Conditions for the preparation of magnesium hydroxide in granular form were standardized. Experiments were carried out on the preparation of hydrobromic acid by direct combination of bromine and hydrogen over a heated catalyst in a glass reactor. The process for the preparation of 13X type molecular sieve was demonstrated.

A bench scale model of an electrodialysis unit (120 litres/day) was set up to desalt saline water of 500-1000 ppm (total dissolved solids). The unit, which gave product water of less than 30

ppm (tds), could be used in place of equipment using the conventional ion-exchange resin processes. A preliminary study was made to desalinate brackish water using wind power as a source of electricity to operate a small electrodialysis unit. Projects relating to the purification of inferior quality *gur* and scale-up work on extraction of nicotine from tobacco waste were completed. A laboratory electrolytic cell using perfluorosulphonic acid membrane was set up for electrolysis of sodium chloride to produce caustic soda. Ten inorganic ion-exchangers, valued at Rs 26,500, were prepared for the Bhabha Atomic Research Centre, Bombay. A mixed oxide prepared from bismuth and thorium in 5:1 ratio showed good capacity as an anion-exchanger.

The preparation of cellulose acetate benzoate for use as membrane in the reverse osmosis technique was optimized on a laboratory scale, and the membranes cast from the product gave consistently 93-96% salt rejection and 8-10 gfd product water flux. Also, the preparation of cellulose acetate methacrylate was standardized on a laboratory scale; the membranes cast from the mixed ester gave a product water flux of 15 gfd with 90% salt rejection.

A spiral module of a reverse osmosis plant for desalination of 10,000 litres of brackish water per day has been fabricated and commissioned. Attempts were made to concentrate orange and pineapple juices through the reverse osmosis technique.

In marine algal research, an important project was concerned with the substitution of the cereal part of poultry feed by seaweeds like *Gracilaria*. It was found that this seaweed could be incorporated in the poultry feed up to 10% by replacing yellow maize without any untoward effects on the egg-laying capacity. On vegetative and spore production of the seaweed *Enteromorpha* the effects of (i) red, yellow and green lights, (ii) six enriched sea water media, and (iii) salinity have been studied. Maximum spore production and development of germlings were observed under blue light. VES and ESP media were found good for spore production and vegetative growth. Salinity in the range 21.03-68.85% was conducive to the vegetative growth of the alga.

Studies on the effect of varying the water hyacinth-seaweed ratio in a digester on biogas production have shown that increasing the proportion of water hyacinth does not improve the performance of the digester; rather, the production of biogas improved with greater percentages of seaweed. The results confirm that the specific microflora responsible for the breakdown of the seaweed polysaccharide to volatile acids cannot effectively do so on the cellulose of the water hyacinth.

Field experimental units were set up in the semi-arid and sub-humid regions for growing crops of economic importance by using sea water, or diluents or brackish water as irrigants.

In collaboration with the Veterinary College, Madras, studies have been taken up on propagation and chemical and nutritive assessment of the halophyte *Avicennia*. The method of raising a nursery of jojoba, a source of liq wax, has been standardized. overcome the chemical dormancy of seeds of guayule (which yields a rub substitute) obtained from Mexico a Arizona, a chemical treatment has b worked out.

In solar energy utilization laboratory made considerable progre Following the installation, by Central Electronics Ltd, of a solar operated pump (120 peak watt capaci at Awania solar distillation plant pump product water from the und ground tank to the supply tank, t institute has started collection of da for evaluation. A solar ice machine of kg/cycle capacity was fabricated, a work on the construction of a sol pond (35 × 35 m) was started.

Five processes were released industry during the year; these related the manufacture of table salt/dairy sa bromine, mechanical salt harveste cattle licks, and precipitated silica. Tw patents were filed, and 29 researc papers published.

The total budget of the laboratory fo 1979-80 was Rs 85.912 lakh.

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

Zinc Sodium Silicate Primer

Primers are used for protecting steel surfaces exposed to atmosphere. Red oxide, zinc chromate, and red lead are the commonly used primers. However, these primers are not intended to give protection by themselves; the primer treatments have to be followed by finishing paints.

Keeping in view the drawbacks of the conventional primers, the Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a process for the preparation of zinc sodium silicate primer for protection of all types of steel structures in marine environment. The process consists in reacting zinc dust with sodium silicate, and adding red lead. The whole mass is ground to form a uniform paint, its consistency being adjusted by the addition of water to form a brushab primer. The primer can be applied i humid atmospheres and on met surfaces even under wet conditions. Th hard and abrasion-resistant coatin formed on the surface can be easil removed by an acidic wash.

The process has been studied on a 3 k per batch scale.

Sodium silicate, zinc dust, red lea and de-ionized water, all of which a indigenously available, are the main ra materials required in the process.

The items of equipment required ar de-ionized water unit, mixer with 0.5 h motor, mixing tank, thickness teste stainless steel tank, and balance. All th items are available indigenously.

The capacity of the minimu economic unit as suggested by CECRI 150 tonnes/annum (one shift of 8 hr).

l capital on building of Rs 60,000, a l capital on plant of Rs 63,000, and a king capital of about Rs 6,29,000 are ired for setting up a plant of the ve-mentioned capacity. The cost of duction has been worked out to be ut Rs 16,000 per tonne.

he process (NRDC Process No. .11.80) is available through the tional Research Development Corration of India (61 Ring Road, Lajpat gar III, New Delhi 110024) from om further details may be tained. □

Tide and Wave Telemeter

r monitoring tidal levels and waves ng the coast or at deeper waters the tional Institute of Oceanography IO), Dona Paula, Goa, has designed d developed a tide and wave emeter. The instrument's transducer s to be mounted on suitable structures e piers along the coast or drilling rigs the ocean.

The instrument consists of a water el transducer and an electronic onitoring unit, both being connected a long two-core cable. There are two pes of transducer and electrical wave ff. The type of transducer chosen is cording to the facilities available for ounting. The transducers produce ctrical signals proportional to the ater level. The signals from the ansducers are very strong so that they n be conveyed to the electronic unit ithout noise interference. The elecnic display unit displays the water vel. The signals are further separated to their components: tide and wave. ll the information can be separately splayed in continuous recorders.

The institute has designed and bricated three prototypes whose rformance has been found satisfacry. The device has a tidal range of 0m (with provision for higher ranges) nd an accuracy of ± 5 cm.

Fully solid-state and operating on 9V ry cells with display on a microammeter, the device has also provision for eeding the signals to a continuous stripchart recorder.

The main components required are stainless steel bellows, PVC tube, brass nuts, special-type stainless bolts, fibreglass resin, stainless steel tubes, instrument box and electrical and electronic components like two-core cable, metal film resistors, carbon film resistors, microammeter, transistors, zener diodes, transformers, switches, dry cells, and battery box. All these items are available indigenously.

The main equipment required, all of which are also available indigenously, are a small lathe, an electrical drill, a grinder, a PVC-welding set, and a coil-winding machine.

The main test instruments required are transistor tester, oscilloscope, FET voltmeter, and multimeter, and all these are available indigenously.

The capacity of an economically viable unit, as suggested by NIO, is 20 pieces/annum. Such a unit entails a total capital of Rs 1.50 lakh—Rs 60,000 on building, Rs 60,000 on plant and Rs 30,000 as working capital. The cost of production has been estimated as Rs 4600/piece.

The process (NRDC Process No. 885.09.80) is available through the National Research Development Corporation of India (61 Ring Road, Lajpat Nagar III, New Delhi 110024) from whom further details may be obtained. □

PERSONNEL NEWS

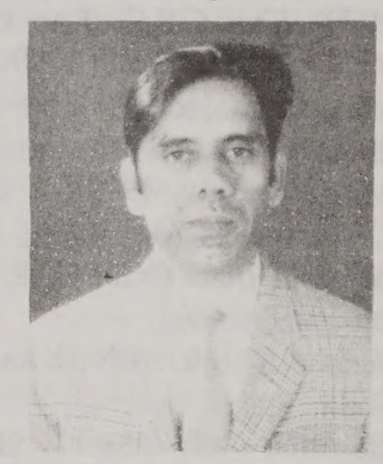
Appointments/Promotions

Dr Thyagarajan Appointed Director, RRL-Hyderabad

Dr G. Thyagarajan, Director, Regional Research Laboratory (RRL), Jorhat, has been appointed Director of RRL, Hyderabad, with effect from 2 February 1981.

Born on 2 May 1934, Dr Gopalakrishna Thyagarajan obtained his M.Sc. degree in organic chemistry in 1956 from the Osmania University, having secured the distinction of first in first. Soon after, he joined RRL, Hyderabad, and obtained his Ph.D. from the Osmania University. He was a postdoctoral fellow at the University of California, Berkeley, USA, during 1964-65 and Visiting Scientist, National Institutes of Health, Bethesda, Md, USA, during 1969-71. He was appointed Director of Jorhat laboratory in 1974.

He has more than 40 research publications to his credit. His research interests include organic synthesis with particular reference to heterocyclic chemistry, natural products chemistry,



reaction mechanisms and development of process know-how for pesticides, drugs and industrial organic and inorganic chemicals. The application of modern management techniques to research and development has also been one of his interests. He has undergone a 6-month course in principles of management conducted by the Foundation for Advanced Education in the Sciences, Princeton, and was one of the 15 participants selected from different countries for in-service group training sponsored by UNIDO for managers and senior executives of industrial research institutes in the Netherlands (1973).

Dr Thyagarajan is chairman of the coordination council for chemical sciences group of CSIR laboratories and member of CSIR (Society) and of its governing body. He is also a member of the board of directors of the National Research Development Corporation of India, and is connected with several academic, industrial and financial institutions. He is also acting as chief coordinator, Commonwealth Science Council—UNEP project on management of water hyacinth, and as member of the steering committee of the Commonwealth Regional Rural

Technology Programme, CSC, London. □

* * *

At the National Environmental Engineering Research Institute (NEERI), Nagpur, and its zonal laboratories, the following have been promoted consequent upon assessment:

As Scientist C: Dr G.B. Shende (15 Oct. 1975), Shri S.K. Titus (30 June 1978), Dr (Smt) I.S. Jayangouder (16 March 1979), Shri C.S.G. Rao (zonal laboratory, Delhi; 16 March 1979), Shri S.K. Shrivastava (zonal laboratory, Ahmedabad; 16 March 1979), Shri A.W. Deshpande (30 July 1979) and Dr P.V.R.C. Panicker (4 Aug. 1979).

As Technical Officer C: Shri V.R. Apte (16 March 1979).

As Scientist B: Shri A.N. Khan (22 April 1979).

As Scientist A: Smt Shanta Satyanarayana (1 Sep. 1976; officiating as Scientist B since 19 Oct. 1977), Shri S.B. Lakhe (15 April 1977), Shri B.Z. Alone (30 June 1978), Shri S.N. Khadakkar (4 July 1978), Miss N.S. Joshi (22 April 1979), Shri A.D. Patil (31 May 1979), Shri M.S. Olaniya (17 June 1979), Shri R.C. Dixit (zonal laboratory, Delhi; 30 June 1979), and Shri S.V. Deshpande (zonal laboratory, Ahmedabad; 4 July 1979).

Honours and Awards

Dr B. Singh

Dr B. Singh, Acting Director, Central Mining Research Station, Dhanbad, has been awarded the Dewan Bahadur D.D. Thacker Coal Mining Gold Medal for 1979-80 by the Mining, Geological and Metallurgical Institute of India in recognition of his outstanding work in coal mining and related sciences with special reference to technical advances in coal mining. □

Centre for Management Development in R&D

The CSIR's Management Development Unit has been upgraded and renamed as Centre for Management Development in R & D. The centre will continue to function as part of the Planning Division of CSIR. □

PATENTS FILED

454/Del/80: Improvements in or relating to anti-corrosion packing papers, K.S. Rajagopalan, N. Subramanyan, R. Srinivasan, R. Radhakrishnan, N. Krithivasan, M. Sundram & M.E.K. Janaki—CECRI, Karaikudi.

852/Del/80: A process for preparation of sodium silicate paddy husk, P.C. Borthakur, Saikia, R. Baruah & S.N. Dutta—Jorhat.

880/Del/80: A process for ma duplicating ink with rice bran oil, Gupta, J. Rai & H. Singh—NPL, Delhi.

फार्म 4/FORM IV

[नियम 8 देखिए/(*See* Rule 8)]

1.	प्रकाशन स्थान/ Place of publication	New Delhi
2.	प्रकाशन अवधि/ Periodicity of its publication	Semi-monthly
3.	मुद्रक का नाम/ Printer's Name	Y.R. Chadha
	(क्या भारत का नागरिक है?)/ (Whether citizen of India?)	Yes
	(यदि विदेशी है तो मूल देश)/ (If foreigner, state the country of origin)	
	पता/Address	Publications & Information Directorate Hillside Road, New Delhi 110012
4.	प्रकाशक का नाम/Publisher's Name	Y.R. Chadha
	(क्या भारत का नागरिक है?)/(Whether citizen of India?)	Yes
	(यदि विदेशी है तो मूल देश)/ (If foreigner, state the country of origin)	
	पता/Address	As above in (3)
5.	संपादक का नाम/ Editor's Name	Y.R. Chadha
	(क्या भारत का नागरिक है)/(Whether citizen of India?)	Yes
	(यदि विदेशी है तो मूल देश)/ (If foreigner, state the country of origin)	
	पता/Address	As above in (3)
6.	उन व्यक्तियों के नाम व पते जो समाचार-पत्र के स्वामी हों तथा जो समस्त पूंजी के एक प्रतिशत से अधिक के साझेदार या हिस्सेदार हों। Names and addresses of individuals who own the newspaper and partners or share holders holding more than one per cent of the total capital.	

मैं,_____, एतद्द्वारा घोषित करता हूं कि मेरी अधिकतम जानकारी एवं विश्वास के अनुसार ऊ
दिए गए विवरण सत्य हैं।

I, Y.R. Chadha hereby declare that the particulars given above are true to t
best of my knowledge and belief.

Sd/-Y.R. Chadha

ता०/ Dated 15 March 1981

प्रकाशक के हस्ताक्षर/ Signature of Publishe

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